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President’s Letter

August and September 2016 were challenging for the NEAEP, as we coped with the tragic and unexpected passing, on the eve of our 2016 Symposium, of our founding executive director, Rhicco Rentas. Losing Rhicco forced the NEAEP Board of Directors to take over the day-to-day management of the organization and to familiarize themselves with the minutest details of hosting the annual symposium. I am proud to say that we rose to that challenge, especially thanks to Hollie Stillwell, the outgoing president, Dave Dawson, our treasurer, John Dascanio, our past president, and the excellent NEAEP staff. Because of their efforts we were able to host a successful symposium at Niagara Falls, with a day of outstanding wet labs at MK Quarter Horses. We all wish Rhicco could have seen that success, and perhaps, at some level, he did. He was certainly responsible for much of it.

However, the challenges continue as we plan our 2017 symposium in Norfolk VA. The goal of NEAEP has always been to provide outstanding continuing education for veterinarians and farriers. In pursuit of this goal we have employed David Dawson as our executive director during this period of change. Dave is both a Farrier, a founding member of the AAPF, and a partner in an equine business management company. Through Dave’s leadership NEAEP is reinventing itself as a transparent organization, with an engaged board of directors focused on the needs of our membership and industry partners. I have been humbled and inspired by the commitment and expertise of the equine practitioners of all stripes who make up our board, and through them I feel confident we will meet the challenges which lie ahead.

It is both an honor and privilege to assume the roll of President of this excellent organization for the upcoming year. As a veterinarian and Theriogenologist who has had the pleasure of hosting an annual symposium for our state Farriers Association in Maine, I have seen first hand how the welfare of horses is greatly improved when veterinarians and farriers work together in an atmosphere of mutual respect. Consequently, I look forward to bringing equine practitioners together in Norfolk VA in 2017 for some of the best continuing education available in equine lameness, podiatry, internal medicine and reproduction. I hope you will join us.

Sincerely yours,

Robert C. Causey DVM, PhD
President,
Northeast Association of Equine Practitioners
Affecting The Hoof–Ground Contact and the Pressure Exerted On The Hoof Capsule in the Stance Phase by Orthopedic Shoeing

When Should I Use More than My Stethoscope?
Resting EKGs, Exercising ECG’s, Holters or Echocardiograms?

Four Core Communication Skills of Highly Effective Practitioners

Colic in the Peripartum Mare

Neck Pain and Dysfunction: Clinical Examination

You Want To Buy This One?? My Approach To The Purchase Exam In The Sport Horse
Affecting the Hoof–Ground Contact and the Pressure Exerted on the Hoof Capsule in the Stance Phase by Orthopedic Shoeing

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Werkman Horseshoe factory, Groningen, Netherlands

INTRODUCTION

During the stance phase high strains affect the equine distal limb, leading to a high incidence of injuries and orthopedic disorders resulting in lameness. Tendons, ligaments, joints and particularly the hoof are highly loaded by vertical pressure as one component of the ground reaction forces (GRF). These forces change their magnitude, direction and point of application during the different stages of the stance phase. The landing includes the initial contact (IC), during which the impact peak affects the foot. Thereby, the hoof lands flat, or part of its solar border lands first and the hoof rotates about the craniocaudal and/or lateromedial axis to attain full contact. Initial contact is accompanied by stabilization of the interphalangeal joints, loading the short ligaments of the toe and soft tissues. The extent of stabilization of the lateromedial rocking motion is mainly dependent on the described characteristics of the initial contact. Subsequently, the mid-stance phase, during which the maximal vertical component of the GRF affects the limb and the location of the center of force (CoF) changes slightly, lasts until the heel-off. In this phase the location of the CoF shows the mainly loaded part of the weight bearing surface of the hoof capsule. The succeeding breakover is defined as temporal, from heel-off to the last ground contact of the toe (toe-off), or spatial, as the point of breakover describing the most dorsal location of the solar aspect of the hoof that contacts the ground.

In all these phases, vertical pressure affects the hoof capsule and its enclosed, sensitive structures. Pressure exerted on the hard epidermis is directly transmitted to the sensitive dermis with its complex blood circulation and innervation. Furthermore, forces exerted on the hoof capsule affect the bony structures surrounded by the hoof horn. Pressure affecting the distal phalanx can result in bone remodeling, while increased pressure on the frog loads the navicular region.

Therefore, with the application of modified horseshoes, such as bar shoes, open toe shoes or other surface modifications, specific regions of the hoof capsule can be directly relieved to support the recovery of diseased parts of the hoof.

Additionally, one must bear in mind that the use of orthopedic horseshoes to relieve tendons, joints or ligaments of the equine distal limb might affect the pressure distribution on the hoof capsule as an unintended side effect leading to an intolerance of the shoeing. Moreover, modifications of a horseshoe can cause an effect on the hoof–ground contact during motion. This can be useful, such as a facilitated breakover, or contraindicated, such as instability in motion.

Therefore, it is essential to understand the influence on the pressure distribution by changing the weight bearing or supporting surface of a horseshoe. The to describe the effect of modified horseshoes on the pressure distribution exerted on the hoof capsule and the hoof–ground contact during motion.
to optimize the treatment of horses with orthopedic disorders related to the hoof and the distal limb.

METHODS

For the kinetic measurements, 25 clinically sound warm-blood horses from one stable were used (mean age 8.6 (5–17) years, mean wither height of 1.56m (1.40m–1.72m). The animals were divided into 5 groups (5 horses each). In each group the barefoot situation as well as the application of a standard horseshoe and the corresponding modified horseshoes were examined. For all horses, trimming, adjustment and shoeing were always performed by the same experienced farrier. After trimming, standard horseshoes were adjusted for both forelimbs; thereafter, all horses were shod with the modified shoes. In total, four standard horseshoes and ten modified horseshoes changed by forging, adding welding parts or wedges were examined. Data were collected separately for the barefoot hoof, the standard horseshoe and the horseshoe modifications of the left forelimb of each horse.

The kinetic examinations were carried out consecutively on four 30-m long tracks of concrete, rubber mat, firm and deep sand for 10s. In order to evaluate the kinetic data of the [TekScan*-System], six to seven steady strides were averaged into one image and parameters were analyzed using the [Hoof Software (6.62)]. These averaged images were used to assess the location of the initial contact, the landing phase, the position of the center of force during the mid-stance phase and the breakover. Additionally, the distribution of the pressure exerted on the weight bearing surface of the hoof capsule was evaluated. Therefore, the averaged image of six to seven strides was divided to calculate the percentage pressure affecting the medial and lateral hoof half or the toe, the middle of the hoof and the heel region.

RESULTS AND DISCUSSION

The modification of a standard horseshoe with therapeutic intention is always associated with a change in the weight bearing surface of the shoe. By adding wedges or creating a rocker shoe, the bearing area of the shoe is decreased. Shoes with partially increased supporting areas such as a wide toe shoe, a wide branch shoe or a bar shoe provide a greater area over which the acting forces can be distributed. The vertical pressure as one of the components of the ground reaction forces is mainly determined by the weight of the horse and dynamics. By changing the weight bearing area of a horseshoe, the distribution of the pressure forces exerted on the shoe and transmitted to the hoof capsule are automatically affected as well. The same weight and dynamics can be distributed over a smaller or larger area, resulting in pressure peaks which are more evenly distributed.

The impact of modified horseshoes on the pressure distribution exerted on the hoof can be desired to relieve a diseased region of the hoof (navicular region, dorsal hoof wall, ulcers, and cracks) or it can be an unintended side effect of orthopedic shoeing primarily used to relieve tendons or ligaments of the distal limb.

In the current study the aim was to simultaneously examine the pressure distribution affecting the modified horseshoe and the forces transmitted to the hoof itself. Therefore, two sensors where attached to one hoof, as described above.
The following describes a few examples of modified horse-shoes and their effects on the pressure distribution. The eggbar and heartbar shoe increase the loaded area according to their welded-in bar, causing a more even distribution of pressure forces. However, the manufacturing of both modified horse-shoes is crucial for their impact and mainly depends on the diagnosis. With different realizations of shoeing with bar shoes, the pressure force distribution can be altered significantly. The most important aspect is the integration of the frog in weight bearing or its relief. Farriers distinguish three different technical realizations of bar shoes by changing the level of the bar or adding cushions and pads: a) negative (heels solely, e.g. navicular disease), b) neutral (heels and frog evenly loaded, e.g. laminitis) and c) positive (heels relieved, e.g. quarter cracks) load of the frog.

When suggesting the application of a bar shoe, it is essential to communicate the diagnosis and intended biomechanical effects to the farrier to provide him with the background information required to create the modified shoe. In the current study, the eggbar (A)- and heartbar (B) shoes show a behavior similar to heel wedges, with pressure peaks located under the toe and especially the heel region, which is most likely caused by a restriction of the lateral movement of the heels predefined by the hoof mechanism. Therefore, long-term application may lead to heel crushing. In contrast, an increased load at the frog to relieve the heels or to distribute the pressure more evenly in the palmar region may compromise the sensitive navicular region especially if hidden pathologies exist.

To assess how much load an individual horse can tolerate on a specific area and ultimately find a comfortable shoe, carrying out provocation tests before shoeing—such as taped blocks under the area intended to bear more load or the use of a hoof tester—can be helpful.
Another example is that the open toe shoe significantly relieves the dorsal hoof wall but creates high pressure values under the ends of the branches. This could lead to pain in these areas and intolerance of the shoe in horses with thin and sensitive soles. Also, due to the lack of support underneath the dorsal wall combined with the visible pressure peaks, in cases of severe laminitis with a descended and rotated distal phalanx this could cause severe pain. **Thorough grinding of the ends of edges could reduce the occurrence of pressure peaks to improve the comfort of the shoe.**

In contrast, the wide toe shoe increases the supporting surface underneath the toe, which distributes the load more evenly. Still, the stress on the hoof capsule increases and shows pressure peaks in relation to the narrowed down branches. On penetrable ground, the load on the toe increases, because of the reduced sinking in by the additional support on the toe. Similar results occurred for the wide branch shoe, which also showed pressure peaks and increased load under the supported region. In both cases, **the creation of a sole relief by forging can minimize the load on the sensitive sole by keeping the increased weight bearing surface at the supported region.**

In general, it can be demonstrated that it is almost impossible to relieve one part of the hoof without overloading another region. This may negatively affect the sensitive dermis and blood circulation negatively over a long-term period. In severe cases, bone remodeling at the distal phalanx and intolerance of the shoeing might be a consequence. **Therefore, the application of a modified horseshoe should be temporary and limited to the period of injury.**

The acting forces change during the stance phase, as well as during the initial contact, the mid-stance phase and the breakover, as described above. The following shows the impact of modified horseshoes on the hoof–ground contact during motion. In general, the main impact of modified horseshoes on this parameter occurs on firm ground.
In particular, the use of horseshoes modified in their partial height has a significant influence on the initial contact and landing of the hoof. The application of heel wedges and studs leads to a sudden transition and mediolateral instabilities from the initial contact to the mid-stance phase. The use of a rocker shoe causes dorsopalmar instability during landing.

Contrastingly, shoeing with horseshoes modified in their weight bearing surface (bar shoes, wide toe shoe, wide branch shoe) has no impact on the hoof–ground contact during motion.

In a few cases the specific change of the landing is intended. If a distinct unilateral initial contact is shown by the horse, which might be related to higher stress on joints and ligaments of the distal equine limb due to the increased impact peak, the application of side wedges is one approach to stabilize the landing. The creation of a plane landing can relieve said structures and aid therapeutic treatment of articular disorders. However, in the current study a 4° elevation of the lateral side with a side wedge did not alter the hoof–ground contact in the same manner in each case. Two out of five of the examined horses were able to compensate the effect of the applied Side Wedges on their individual landing pattern. The strain affecting the involved muscles, tendons, ligaments and joints during this compensation cannot be assessed. In the field, the optimal position and height of the wedges is ideally evaluated in several trials to find the location in which the hoof–ground contact is affected in the intended way. Still, the intended change of the landing cannot be achieved in every horse, which is most likely due to their individual body conformation. The authors are of the opinion that the more proximal the occurrence of the deformities in the locomotor system, the less likely the resulting undesired landing can be affected by a side wedge. Moreover, one must bear in mind that in addition to the impact peak during the initial contact, the distal limb is loaded mainly during the mid-stance phase. The application of a side wedge to correct the landing pattern is related to a unilateral shift of the load affecting the hoof during the mid-stance phase towards the elevated side. For each individual case, one must carefully judge whether the correction of the initial contact of the hoof towards a plane landing outweighs the disadvantage of an unequal loading during the mid-stance phase.

The breakover distance can be influenced in different ways by modifying a horseshoe. One option is to modify the design of the toe (rockered) or the position of the shoe (reset shoe, open toe shoe). The other possibility is to change the alignment of the toe by using wedges. A steeper orientation of the hoof capsule as created by the eggbar, heartbar and open toe shoe on penetrable ground will act as a reduced anterior moment arm compared to the situation on hard ground, and the initial position of the hoof is advantageous since the DDFT has to apply less tensile force. Other studies describe that decreasing the distance of breakover, as shown by the open toe shoe, reduces the static strain of the DDFT during breakover. Nevertheless, other research groups were not able to find any significant differences in the breakover time using shoes with various different toe designs (plain, rockered, rolled, squared). However, in the current and other studies it was demonstrated that the smoothness of breakover was increased by a rolled toe, due to a less abrupt breakover process.

In general, careful evaluation of the orthopedic patient in motion should be carried out to assess the landing of the hoof, the load during the mid-stance phase and the breakover in order to choose the optimal modification. Moreover, shoeing has to be adapted to the stage of convalescence as soon as the horse starts to be moved and worked again, since different effects of modified horseshoes can be expected in statics and dynamics.
Cardiac auscultation is often the first clue for the detection of valvular, arrhythmic or congenital disease that can affect performance, safety or life expectancy. The most common physical examination findings that alert clinicians about cardiovascular disease are murmurs and irregular rhythms. The importance of careful auscultation and description of the heart rhythm and murmurs cannot be overemphasized. In some occasions diagnostic aids such as electrocardiograms, echocardiograms or measurements or cardiac biomarkers will be useful to the equine clinician.

The electrocardiogram (ECG or EKG) is the recording of the electrical activity of the heart. This can be printed in a paper, displayed on a screen or stored digitally. Units that display the ECG in real time are called telemetry units and the 24-hour continuous ECG recording is called Holter.

The base-apex lead is, however, the most commonly used and often gives you the information that you need. To obtain a base-apex ECG place the left arm electrode (LA=Left Arm, positive, usually yellow) behind the left elbow- this is the apex. The right arm electrode (RA=Right Arm, negative, usually red) in front of scapula and the ground electrode (RF=Right Foot, usually black) attached at a site remote from the heart. For example over the right jugular groove. If you have position the leads correctly (and the horse has a normal rhythm) leads one and two will show a positive P wave followed by a QRS complex with formed by a small positive deflection and a large negative deflection (rS morphology) and followed by a T wave that is the typical base apex ECG of horse. If you decide that you want to see additional leads you can easily apply more self-adhesive electrodes and clip the leads to them or use alligator clips.

Currently is common to record ECGs digitally. A system called Televet is the most popular system worldwide for horses. It records ECGs without the need of clips and the rhythm is transmitted to a computer via Bluetooth. It can be used for continuous or exercising recordings.

Another popular option to obtain an ECG is to use a case that can be adapted to a smart phone (Alive core™). This will quickly give you a non-standard lead that you can interpret on the screen, print or email to a colleague. It is a good option for field veterinarians, for short recordings and for owners of animals with recurrent arrhythmias. It is less useful for the hospital setting in which continuous recording are more commonly needed.

When premature beats are auscultated during a prepurchase examination an electrocardiogram is almost always indicated. A continuous electrocardiogram (Holter) may be important as occasional premature contractions (average of less than 1/hour) is consider ‘normal’. Arrhythmias cab be intermittent and often short recordings do not demonstrate all arrhythmias oresent in one individual. In other species the prognosis and relevance of some arrhythmias is correlated with their frequency over a 24-hour period.

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In horses that are to be ridden performing an exercising electrocardiogram is often indicated. Auscultation of an arrhythmia or a diastolic murmur are the most common indications for an exercising electrocardiograms. In general SVPCs are less concerning than VPCs although the increased risk for atrial fibrillation needs to be considered. Premature beats that are overdriven during exercise are considered more benign. Aortic regurgitation and exercise make the perfect arrhythmic cocktail; the ventricular enlargement and remodeling, the decreased coronary perfusion caused by the aortic regurgitation, the shortened diastole caused by the increase in heart rate, the increased oxygen demand and the increased sympathetic tone caused by the exercise combine to predispose to arrhythmias. Horses with moderate or severe aortic regurgitation that continue to exercise should have an exercising electrocar-
diagram to investigate if exercising arrhythmias are present and an echocardiogram to assess the cardiac structure and function. Mitral or tricuspid regurgitation are less commonly associated with exercising arrhythmias.

The interpretation of continuous or exercising electrocardiograms is usually simple. However it requires practice, is often time consuming and in some cases the interpretation is complex. For practitioners that see cardiac cases very frequently or that integrate exercising electrocardiograms in a busy sports medicine practice it may be useful to learn how to interpret exercising rhythms. For many others learning to acquire recordings and seeking advice for interpretation is the highest yield approach. The equipment is currently affordable (2.5-3000USD) and after an initial investment the electrodes and other supplies needed to acquire a continuous or exercising ECG may cost 2-3USD/recording.

Echocardiograms are indicated when significant valvular disease is suspected, to determine if arrhythmias are associated with structural heart disease and in all cases in which congenital heart disease is suspected or continuous murmurs are heard in adult horses. Some general rules follow.

A horse with aortic regurgitation needs an echocardiogram when:
- When the arterial pulses are bounding
- When it is young
- When the horse has ventricular premature beats
- When the horse has other signs of heart disease:
  - mitral regurgitation murmur
  - VSD murmur is present
  - atrial fibrillation
  - exercise intolerance

A horse with a right sided murmur needs an echocardiogram when:
- When the murmur is grade 4-6/6 and holosystolic or pansystolic
- When other signs of heart disease:
  - Poor performance
  - A fib
  - MR or VSD (relative PS) murmurs
A horse with a left sided systolic murmur needs an echocardiogram if:

- If the murmur is 3-6/6 and holo or pansystolic
- If the murmur is band shaped and holo or pansystolic
- If the horse has other signs of heart disease:
  - Increased respiratory rate or effort
  - Atrial fibrillation
  - Exercise intolerance/poor performance

A horse with an irregularly irregular rhythm should be considered to have atrial fibrillation until proven otherwise. Atrial fibrillation is the most common clinically relevant arrhythmia in humans and horses. Atrial fibrillation affects performance in horses that practice high intensity exercise but many horses used for pleasure riding or low intensity equestrian sports can do so while in atrial fibrillation. The decision to convert a horse to normal sinus rhythm is multifactorial. Duration of the arrhythmia, presence of previous episodes, presence of underlying heart disease, economic factors, risk aversion of the owners and the use of the horse are some of these factors. There is ongoing debate about the safety/risk for collapse in horses with AF. If a horse is not going to be converted an echocardiogram and an exercising electrocardiogram are needed to determine if it is safe for the horse to exercise. Current recommendations in horses with sustained atrial fibrillation are that these horses should only be used by informed adult riders and exercise should be limited to a level considered relatively safe based on the exercising ECG.

The evaluation of horses with murmurs or arrhythmias is centered on echocardiograms and electrocardiograms. In the work up a horse with poor performance evaluation of the cardiovascular system is often better done in conjunction with the evaluation of the musculoskeletal and respiratory (upper and lower) systems and the assessment of the fitness status and progression of training. A standardized exercise test often includes evaluation of fitness, musculoskeletal system, upper respiratory tract, lower respiratory tract and cardiovascular system by means of: historical questionnaire, general physical examination, lameness examination and gait analysis using gyroscopes, resting and dynamic upper airway endoscopy, bronchoalveolar lavage, echocardiograms, exercising electrocardiograms and measurements of lactate, PCV, heart rate, CK and sweat response before, during and after exercise. I believe that a team approach for the simultaneous evaluation of different body systems and fitness is useful for the evaluation of poor performance and in some cases as a preventative medicine approach for the management of high level athletes.
The ‘90s make for a fun party theme, not an effective equine vaccine.

You can party like it’s 1999 all you want, but when it comes to effective horse health solutions, it’s time to get serious. Other manufacturers rely on vaccines from the past century. Vetera® is designed with every horse’s long-term health in mind. Through our recently updated portfolio of vaccines, we are committed to providing horses with the best defense against the viruses that threaten them today.

Ask your veterinarian or visit vetera-vaccines.com to learn about our updated portfolio of vaccinations.
The importance of communication in veterinary medicine is an emerging topic, as evident in multiple influential studies published in the past 5 years. For instance, one of the six critical issues identified during focus group sessions of the KPMG LLP study was that “while the scientific, technical, and clinical skills of the veterinary profession remain high, there is evidence that veterinarians lack management and communication skills necessary for success in private practice.” The Brakke Management Study reported that many veterinarians are not earning up to their potential and suggested that a limiting behavior was the failure to use management practices proven to improve business performance. The three management practices that demonstrated the largest potential to increase income were related to employee longevity, employee satisfaction, and client satisfaction. A primary component of these practices involves staff and client communication. A personnel decisions study identified non-technical competencies for career success, including interpersonal competence, work and life balance, effective communication, leadership skills, and business acumen. The American Animal Hospital Association (AAHA) compliance study investigated compliance with six basic health care recommendations: heartworm testing, heartworm preventative, dental prophylaxis, therapeutic diets, preanesthetic screening, and core vaccines. Noncompliance ranged from 17% to 82%, and one of the primary reasons for noncompliance was not making a recommendation because of inadequate communication.

In addition to the findings of these influential studies, there have been substantial changes in the profession that affect veterinarian-client-patient communication. One of the major changes is the increasing recognition of the relationships that people may have with their companion animals [5]. When asked about their relationship with their pets, 85% of pet owners reported that they viewed their pets as family members [1]. In conjunction with this, there is a growing recognition that provision of veterinary services in a manner that acknowledges the human-animal bond should lead to better outcomes for veterinary practices and their patients. Appreciating the impact of animal companionship on the health and well-being of human beings creates a new dimension for veterinarians in public health. Veterinarians’ responsibilities have expanded to include attending to the well-being of their clients as well as their clients’ pets.

In a recent address, Blackwell stated that today’s veterinarians are faced with educated clients armed with questions and greater expectations. Veterinarians’ responsibilities for addressing questions and providing client education are increased. In an increasingly litigious society, consumers are not forgiving of unprofessional services. Most complaints to regulatory bodies are related to poor communication and deficient interpersonal skills, with breakdown in communication being a major cause of client dissatisfaction.

There is limited information in the veterinary literature on veterinarian-client-patient communication, and what is available is predominantly based on expert opinion and anecdotal information rather than on peer-reviewed scientific studies. In contrast, the human medical communication literature contains a large number of empiric studies; as a result, evidence-based recommendations guide communication skills training. Much can be learned from studies of physician-patient communication to inform teaching and research programs in veterinary-client-patient communication [7].

The purpose of this article is twofold: to present four core communication skills and the associated evidence and to provide support for development and implementation of the four core communication skills in clinical practice to enhance clinical outcomes. Although empiric evidence linking communication with clinical outcomes is lacking in veterinary medicine, the author hypothesizes that effective communication between

Four Core Communication Skills of Highly Effective Practitioners

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We are now Zoetis. Built on 60 years of experience as Pfizer Animal Health, we are now more focused than ever to help you improve every aspect of care and treatment of horses, every day. Although our name has changed, our commitment to healthy animals has not. To see how we do it, visit us at zoetisUS.com.
veterinarians and clients is strongly associated with improved client and pet outcomes of care.

UNDERLYING PREMISES
Based on 40 years of research in human medicine, three underlying premises guide communication skills training:

1. Communication is a core clinical skill essential to clinical competence, alongside physical examination, medical knowledge, and problem solving.
2. Communication is related to significant outcomes of care, including diagnostic accuracy, time management, a collaborative physician-patient relationship, patient and physician satisfaction, adherence, patient health, and malpractice risk.
3. Communication can be taught and is a series of learned skills. Communication skills can be delineated, defined, and measured, and these skills are best learned through observation, well-intentioned and descriptive feedback, repeated practice, and rehearsal of skills.

COMMUNICATION SKILLS
Communication skills are a vital component of interpersonal interactions. Three broad types of communication skills have been identified: content skills, process skills, and perceptual skills. Content skills are what doctors communicate—the content of their questions and the information they give. Process skills relate to how doctors communicate through verbal and nonverbal methods of communication. Verbal communication is composed of what is said, in particular word choice. Nonverbal communication is the message that is communicated without the use of words and is conveyed through verbal indicators (ie, voice tone, volume, and pitch, as well as the pace of speech), facial expression, eye contact, proximity, posture, and gestures. Nonverbal communication bridges the gap between what is said and what is interpreted. Perceptual skills include cognitive skills (ie, problem solving and critical reasoning) and relationship skills (ie, awareness of others, self-awareness, and personal attitudes and biases). Content, process, and perceptual skills all contribute to the overall efficacy of communication.

VETERINARIAN-CLIENT-PATIENT RELATIONSHIP
A “gold standard” does not exist for assessing veterinarian-client interactions, nor is there an accepted definition of the ideal veterinarian-client relationship. In fact, under different clinical circumstances, different models may be appropriate and effective. Flexibility is of utmost importance, and the choice of communication style should be tailored to the individual client and patient.

In human medical practice and veterinary practice, the most common model for the physician-patient relationship is still paternalism. In this model, the veterinarian dominates the medical encounter, setting the agenda and goals for the visit, and the client’s voice is diminished. The content of the discussion is predominantly biomedical, and the veterinarian plays the role of guardian of the patient and acts in the client’s and patient’s best interest.

In contrast, it has been proposed that the optimal model for physician-patient relationships is relationship-centered care, which reflects a balance between physician paternalism and patient autonomy. Relationship-centered care is characterized as a partnership in which negotiation and shared decision-making are used to take the patient’s perspective into consideration. The role of the physician is as an advisor or counselor.

The term relationship-centered care seems to reflect the nature of the veterinarian-client-patient relationship, which is composed of the veterinarian-client relationship, the client-pet relationship, and the veterinarian-pet relationship. In veterinary medicine, relationship-centered care is characterized by a joint venture between the veterinarian and client to provide optimal care for the animal. During the process of gathering information and client education, questions and information giving include lifestyle and social issues that may influence the pet’s health. Respect for the client’s perspective and interests, asking for the client’s opinion, recognition of the client’s expertise in caring for the pet, and acknowledgment of the role the animal plays in the family’s life are incorporated into all aspects of care. The communication skills presented in this article foster the development of a collaborative veterinarian-client partnership.

Four Core Communication Skills
NONVERBAL COMMUNICATION
Nonverbal communication includes all behavioral signals between interacting individuals exclusive of verbal content and occurs in several modes [8]. These behavioral signals include body language (ie, facial expressions, gestures, body position, tension, touch); spatial relationships, including the distance between the veterinarian and client and objects that may act as potential barriers to communication (ie, examination table, animal, computer, seating); paralanguage (ie, voice tone, rate, rhythm, emphasis, volume); and autonomic responses, such as flushing, blanching, tearing, sweating, and changes in breathing pattern and pupil size, which are involuntary nonverbal responses and communicate underlying emotional responses.
Although estimates vary, it is recognized that as much as 80% of communication is nonverbal in nature, whereas only 20% is based on verbal content [8]. Voluntary verbal communication reflects what a person is thinking and effectively communicates discrete pieces of information. Involuntary nonverbal communication tends to reflect what a person is feeling and communicates attitudes, emotions, and affect. In most cases, verbal and nonverbal communication work together to strengthen or reinforce a message; however, on occasion, nonverbal communication can contradict verbal communication. When verbal and nonverbal communication is incongruent, a mixed message is sent and the nonverbal message more accurately reflects the true feelings and is more likely to predict behavior. Miscommunication is more likely to result when nonverbal communication is lacking, such as in a telephone conversation or an electronic mail message.

There are two areas of focus for nonverbal communication. The first is to increase sensitivity to the nonverbal cues of the client, and the second is to enhance awareness of your own nonverbal messages. The tasks associated with picking up and responding to client's nonverbal messages are to enhance sensory acuity and to reflect back what you see verbally. This entails heightening awareness of nonverbal communication and picking up on nonverbal cues, such as the client tearing up, breaking eye contact, looking at his or her watch, tapping his or her feet, or displaying a concerned expression. The second step is to reflect back what you see verbally (ie, “It seems like you may have some concerns about how to progress with Max’s treatment”). The final step is to factor in the client’s response into your next question or direction of the interaction (ie, “We have talked about a lot of options, and this can be quite overwhelming. I would be interested in hearing what questions or concerns you have at this point”). The following example illustrates the process of picking up and responding to a client’s nonverbal cues.

**EXAMPLE**

1. Pick up on the nonverbal cue (eg, client glancing at his or her watch).

2. Reflect back to the client what you see. Veterinarian: “I notice you glancing at your watch.” Client: “Yes, I’m sorry. I’m in a hurry today. How long will this take?”

3. Factor the client’s response into the next part of the interaction. Veterinarian: “I’ll finish up his physical exam in a few minutes, and I would like to talk to you about some approaches we might take to investigate this problem further. I am wondering whether your schedule permits this discussion today or whether we should book another appointment for later in the day or tomorrow.”

It is equally important to pay attention to your own nonverbal messages to ensure that verbal and nonverbal communication work together to reinforce one another [8]. Miscommunication results when verbal and nonverbal messages are contradictory. The nonverbal message usually reflects the underlying truth. Awareness of nonverbal communication is integral to establishing and maintaining a strong collaborative veterinarian-client-patient relationship. Nonverbal communication, such as making eye contact, maintaining an attentive and open body posture, establishing a closer distance, nodding and gesturing, using a caring voice tone, and displaying emotion, has been associated with enhanced patient satisfaction.

**OPEN-ENDED QUESTIONS**

Open-ended questions or statements encourage the person to elaborate or to tell a story without shaping or focusing the content (ie, “Tell me how Max has been doing since his surgery”) [8]. In contrast, closed questions are questions in which a specific or one-word answer is expected (ie, “Has Max
been doing okay since his surgery?”). Open and closed questions are both valuable for gathering information during the clinical interview; however, they are used to achieve different goals. A funnel technique is recommended, starting with the broad open-ended questions to obtain the problem list from the client’s perspective and later asking more focused specific questions to clarify details (ie, duration, frequency, further description).

Open-ended inquiry can be formulated as a statement with phrases like “tell me” or “describe for me” or as a question beginning with “how” or “what”. Questions that begin with “why” may be less effective, because the answer requires a justification and could elicit a defensive response from the client.

**EXAMPLES**

“Tell me about it from the beginning.”

“Tell me more about that...”

“What happened next?”

“What has been going on from when you first noticed the diarrhea up until now?”

“What are your thoughts on what might be causing his lameness?”

“How has Max been doing since our last appointment?”

How questions are asked influences the data-gathering process. Eliciting the full range of concerns during the data-gathering portion of the veterinary clinical interview has implications for the quality and outcomes of care, including appointment length, late-arising problems, premature hypothesis generation and testing, diagnostic accuracy, client satisfaction, adherence to recommendations, and patient health. Open-ended questioning encourages the client to tell his or her story and ensures that the client reveals the full spectrum of concerns. Closed-ended questioning limits the field of inquiry and may obstruct the client from revealing his or her full spectrum of concerns; it can also result in decreased accuracy in data collection and increased chances of “hidden concerns” arising at the end of the visit. Use of open-ended questions aids in understanding the client’s perspective and promotes client participation, enhancing client satisfaction and client adherence to recommendations.

Research findings indicate that veterinarians use primarily closed-ended questioning to gather data. In general, 13 closed-ended questions (range: 0–42 questions) were used per
appointment compared with 2 open-ended questions (range: 0–11 questions). In 75 of 300 appointments (25%), veterinarians did not use any open-ended questioning. Although a standard prescription of the number of open-ended questions to ask per clinical interview does not exist, a general recommendation is to use a funnel approach to data gathering. This means beginning the interview with broad, exploratory, open-ended questions and progressing to more specific, direct, closed-ended questions to clarify details.

**REFLECTIVE LISTENING**

Reflective listening goes hand in hand with open-ended questioning. Reflective listening entails reflecting back in your own words the content or feelings behind the person’s message (ie, “It sounds like you are worried that he might be blocked again”) [8]. Reflective listening demonstrates your interest in the client and your desire to understand what the client is saying [19]. Reflective listening presents a one-way mirror to the client, allowing the client to see oneself and to know that he or she has been heard. Importantly, reflective listening provides an opportunity for the client to clarify, correct, confirm, or add information, enhancing the accuracy of data gathering. In summary, reflective listening enables you to check whether your own interpretation is correct, ensuring accuracy in the clinical interview and encouraging client input.

Techniques for reflective listening include echoing, paraphrasing, and summarizing. Echoing involves repeating the last few words that a client said (ie, “So, Friskie threw up twice last night”). Paraphrasing is to restate in your own words the content or feelings behind the client’s message (ie, “I am glad that you brought him in today. It sounds like you and Friskie had a tough morning”). Summarizing is presenting an explicit summary to the client of the information gathered thus far (ie, “Can I see if I have got this right? Friskie vomited twice last night. He seemed fine up until that point. After dinner, you found Friskie licking off one of the plates, and you are wondering whether he may have eaten something that upset his stomach. Is that right?”).

**EXAMPLES**

“So, you are saying that you’re frustrated with his response to treatment.”

“It sounds like this is really distressing for you.”

“You are wondering if this surgery is a wise decision.”

“I hear you saying that you’re not sure that relocating is the best idea.”

“I sense that you are feeling overwhelmed with making this decision.”

Little research has been conducted specifically investigating the use of reflective listening in clinical interviews. In one study, primary care physicians who used paraphrasing and interpretation were less likely to have a history of malpractice claims. Research findings indicate that reflective listening is an underused tool in veterinary clinical interviews. Approximately 50% of veterinary visits included paraphrasing and interpreting client statements.

**EMPATHY STATEMENTS**

In a general sense, to be empathetic is to put yourself in someone else’s shoes or to see a problem from another person’s position. It is important to distinguish empathy from sympathy. Empathy is viewing a situation from the client’s perspective, whereas sympathy is feeling pity or concern from outside of the client’s position. There is a difference in responding empathetically to someone’s predicament internally and actually demonstrating empathy externally toward another person through expression of an empathic statement (ie, “I sense how angry you have been feeling about Max’s cancer diagnosis”).

There are two tasks in creating an empathetic response. The first is to appreciate another person’s predicament or feelings. The second step is to communicate that understanding back to the client in a supportive manner (ie, “I sense how difficult it is for you to talk about this”). Expression of empathy is strengthened when accompanied by empathic nonverbal communication, including facial expressions, proximity, touch, tone of voice, or use of silence.

**EXAMPLES**

“I can see how hard it is to make this decision.”

“It must have been difficult for you raise this concern with me.”

“It sounds like you did all that you could for Molly.”

“It must have been scary to go through that alone.”

Building a relationship is vital to the success of every appointment, and expressing empathy is central to building a relationship. Use of empathic statements validates the client’s concerns for his or her pet’s health and aids in building trust and rapport, because the client feels as though he or she has been truly heard and accepted. A trusting relationship enables the client to tell his or her story and share concerns, helps to prevent misunderstanding and conflict, and promotes client and physician satisfaction. Rapport-building behaviors are highly valued by clients. In the KPMG study, pet owners ranked “The veterinarian is kind and gentle” first in importance.
in choosing a veterinarian. In addition, pet owners ranked veterinarians first in compassion, honesty, and trustworthiness in comparison to other professionals (ie, physician, accountant, chiropractor, lawyer, dentist, teacher, pharmacist). Building a strong veterinarian-client-patient relationship promotes client satisfaction.

Research findings indicate that empathy statements are underused in veterinary appointments. Veterinarians expressed empathy statements in only 7% of appointments. In the study conducted by Bylund and Makoul, 60% (100/168) of the clinical encounters had at least one empathic opportunity, and an overall mean of 2.49 empathic opportunities was identified per clinical encounter. The results of this study indicate that an empathic opportunity exists in the majority of clinical interviews. Results of the Shaw et al study reported that veterinarians expressed empathy in only 7% of veterinary visits. Using the Bylund and Makoul study as a general indication of the number of empathic opportunities in clinical encounters, it appears that veterinarians in the Shaw et al study missed empathic opportunities.

IMPLEMENTATION

The key steps to teaching and learning clinical communication skills are as follows:

1. Delineation of the skills
2. Observation of skill use
3. Self-reflection on videotaped interactions
4. Feedback
5. Opportunities for practice

The focus of the first part of this article is defining and delineating the four core communication skills to enhance clinical outcomes. The next step in skill development is to create opportunities for observation, self-reflection, feedback, and practice within the clinical setting.

METHODS FOR TEACHING COMMUNICATION SKILLS

Communication is a learned skill and can be taught. Experiential learning techniques have been favored over traditional didactic lectures, and the use of small groups and videotaped or live patients or role-playing actors, together with observation and constructive feedback, has been shown to be far more successful than didactic teaching in terms of skill performance. Teaching methods include self- and peer assessment, provision of descriptive and nonjudgmental positive feedback and constructively phrased negative feedback, offering suggestions for alternative phrasing and behavior, and participant practice. The training program should involve repeated practice with guidance and feedback. This repetitive process reinforces learning efforts and builds skills over time. Communication skills are best taught by providing safe and supportive opportunities to practice.

Communication teaching is performance based and, in the academic setting, involves working in small groups with simulated clients, using practice-based scenarios, under the guidance of a communication coach, who provides descriptive and constructive feedback. Simulated clients are professionals, who have been carefully screened, coached, and trained to express the vast range of client interactions that veterinarians experience in practice realistically. Using cases based on real practice situations and interactions with simulated clients creates the opportunity for students to develop communication skills in a safe and supportive environment in preparation for the day they serve clients in the hospital. Videotaping of simulated client interactions provides an opportunity for students to reflect on their performance and to identify areas of strength and areas for further development.

VIDEOTAPING

Videotaping is recognized as the gold standard of communication teaching, and self-assessment is an important part of analysis of a clinical interview [8,32,33]. Skill development is enhanced through self-observation and reflection of videotaped interactions. Watching yourself on videotape creates an opportunity to identify what you are doing and how you might enhance your performance. Particular sections of the clinical interview can be revisited to focus on the use of particular skills, and the videotape can be reviewed at later dates to assess skill development over time.

It is important to obtain client consent before videotaping. In the author’s experience, clients are willing to consent to videotaping of veterinary visits to enhance veterinarian-client-patient communication. Client consent can be obtained through an oral discussion (see the following example), followed by the signing of a consent form. With the advent of digital technology and the associated reduction in camera size, a tripod-mounted videocamera can be unobtrusively set up in even a small examination room.

EXAMPLE

“I am working on enhancing my client communication skills and was wondering if it would be okay with you if I vid-
eotaped today’s visit. If any concerns were to arise during the visit, I will turn off the videocamera at any time. The videotape will only be used for my learning process and will not be shared with anyone else."

PUTTING IT INTO PRACTICE

Create opportunities for communication skills training in the practice setting using existing resources.

SETTING COMMUNICATION LEARNING OBJECTIVES

The first step in learning a skill is to identify your personal communication learning objectives. Effective learning objectives are SMART (specific, measurable, attainable, realistic, and trackable). For example, a general objective would be to “become a better communicator.” A more specific objective would be to “demonstrate use of open-ended inquiry and reflective listening when interviewing clients during the week.” It is possible to measure the number of times that you ask open-ended versus closed-ended questions and the number of reflective listening statements you used and to monitor your progress in the use of these skills over time. In addition, you can determine the number of times you would like to use these skills in one clinical interview to ensure that your learning objective is realistic and attainable.

IDENTIFYING A COMMUNICATION COACH

The role of the coach is to empower the learner to achieve performance at a higher level through observation, problem solving, instruction, encouragement, and constructive feedback. The coach has the learner’s best interests in mind and fosters a trusting relationship. Choose someone who you think meets these criteria and will best support your learning. Inform your coach of your personal communication learning objectives, and request that your coach observe you conducting clinical interviews. If possible, set aside time immediately after the clinical interview to debrief with your coach and to receive feedback on your performance, and set aside time later in the day to review your videotape while the interaction is still fresh in your mind.

EFFECTIVE FEEDBACK

The success of the coach-practitioner interaction is dependent on the quality of feedback provided by the coach and the practitioner’s receptivity to feedback. Guidelines for effective feedback are listed below:

Feedback should be descriptive rather than judgmental or evaluative.
Make feedback specific rather than general.
Focus feedback on behavior rather than on personality.
Limit feedback to the amount of information that the recipient can use rather than the amount you want to give.
Focus on sharing information rather than on giving advice.
Check out interpretations of feedback
Be well intentioned, valuing, and supportive.

VIDEOTAPE SELF-REFLECTION

Watching yourself on videotape can be a challenging and enlightening experience, and using a structure approach may provide helpful guidance. Watch the videotape the first time without taking notes to get past the natural responses of watching yourself on videotape. Watch the videotape a second time taking notes and recording your initial impressions and reactions. Watch the videotape a third time, and focus on the learning objectives you set yourself to achieve. The following guiding questions may be helpful to you in the self-reflection process:

What strengths in your clinical communication skills did this interaction demonstrate?
What learning needs did this interaction reveal to you?
Which one learning need do you wish to address as a priority?
What actions are you going to take to achieve this?
How will you know when you have reached your target?

OPPORTUNITIES FOR PRACTICE

Given the importance of repetition and reinforcement to skill development, create a timeline for objective setting, observation, feedback, and videotape self-reflection at various time periods based on your individual needs. Different client interactions may trigger your interest in re-evaluating your clinical communication skills. It may be a good learning experience to videotape yourself in diverse interactions with clients, including wellness, problem, and emergency appointments; clients of differing genders, ages, and educational and socioeconomic backgrounds; varying species of animals; new clients and longstanding clients; and clients who are easy to converse with and clients whom you find challenging. This process may help you to identify some constructive solutions to communicating with a myriad of clients.
SUMMARY

For 40 years, medical researchers have been studying physician-patient interactions, and the results of these studies have yielded three basic conclusions: physician-patient interactions have an impact on patient health, patient and physician satisfaction, adherence to medical recommendations, and malpractice risk; communication is a core clinical skill and an essential component of clinical competence; and appropriate training programs can significantly change medical practitioners’ communication knowledge, skills, and attitudes. Many of these findings are applicable to the practice of veterinary medicine. Although research on veterinarian-client-patient communication is lacking in veterinary medicine, we accept that the trust and rapport that results from a healthy veterinarian-client-patient relationship has the potential to motivate clients to make appointments, show up on time, consent to treatment, follow recommendations, pay their bills on time, and refer other people. The end result is personal and professional success resulting from healthy long-term veterinarian-client-patient interactions. It is clear that a focus on interpersonal interactions in veterinary medicine is essential to the ongoing evolution of the profession.

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Colic in the Peripartum Mare

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INTRODUCTION

Colic in the peripartum mare often presents a diagnostic challenge through limitations imposed upon examination. Pre-foaling, the presence of the gravid uterus greatly limits examination of the gastrointestinal tract per rectum. Post-foaling, dilation of the uterus makes evaluation for parturition-related trauma difficult. Although problematic in many cases, accurate differentiation between gastrointestinal and reproductive conditions is essential.

DIAGNOSTIC TECHNIQUES IN THE COLICKY PERIPARTUM MARE

Systemic signs

Cardiovascular parameters are found to be significant predictors of mortality in multiple studies of horses experiencing colic (Furr, 1995; Orsini, 1988; Reeves, 1989). While a useful indicator, heart rate may be variably elevated due to individual tolerance to pain, and heart rate alone cannot be relied upon to predict outcome (Furr, 1995). When elevated, hypovolemia must be considered especially if signs of circulatory compromise are present. Of note, a heart rate within the expected range may be present in the face of significant gastrointestinal compromise. Pulse quality can be assessed at the distal extremities or the facial artery. Poor pulse pressure is suggestive of hypovolemia, shock, or cardiac insufficiency. A bounding pulse may indicate the early phase of endotoxemia.

Elevation of respiratory rate and effort may indicate pain, acid-base disturbances, impediment to the diaphragmatic movement from visceral distension or pleural space disease (pleuritis) which may cause pain in its own right.

Mucous membrane color has been considered a reliable prognostic indicator (Furr, 1995; Stephen, 2004), however retrospective findings are inconsistent (van der Linden, 2003). Pale mucous membranes are associated with hypovolemia or hemorrhagic shock, bright red membranes indicate the early stages of endotoxemia, while a toxic line (dark blue/purple gingival margin) suggests intestinal devitalization and bacterial translocation. Capillary refill time (shorter more favorable) has also been associated with likelihood of survival (Parry, 1983b; Stephen, 2004), however capillary refill time could not discriminate between the requirement for medical or surgical management of colic (Parry, 1983c).

Increased intestinal sounds are seen with irritant conditions with favorable outcomes e.g. colitis. Decreased to nonexistent intestinal sounds can indicate more serious conditions. Hypoperistalsis may be caused by sudden feed changes, carbohydrate overload, or infectious agents. When intestinal sounds are decreased, scant fecal production and acute pain are associated with conditions with a less favorable prognosis.

EXAMINATION PER RECTUM

During rectal examination the size, placement and character of the viscera can be determined. Also, the presence or absence and consistency of feces can be assessed. The spleen, left kidney and uterus can be palpated in most horses. Intestinal distension and displacement most often allows a presumptive diagnosis of small or large intestinal involvement (Reeves, 1989; Reeves, 1991). Careful palpation of serosal surfaces often provides further information, with a rough, gritty texture consistent with visceral rupture and resulting peritonitis.

ULTRASONOGRAPHY

The mainstay of peripartum colic diagnosis is ultrasonography, particularly in the pregnant mare. With increasing duration of pregnancy, the enlarging uterus displaces gut from the body wall obscuring intestinal assessment. The stomach
remains largely unmoved however, with increasing contact against the thoracic wall suggestive of enlargement or compression by distended colon. Gastric stasis and rupture has also been reported secondary to small intestinal ileus post partum (Hillyer, 2008). The stomach wall becomes irregular from loss of appropriate tension and displaced from the adjacent liver and spleen.

Small intestinal strangulation should be considered when distension, mural thickening and loss of motility with separation of content are present (Klohnen, 1996). Small intestine with dilation and motility is associated with large colon lesions, whereas wall thickening with variable motility was present in early enteritis and fulminant peritonitis (Klohnen, 1996).

**NASOGASTRIC INTUBATION**

Character and amount of nasogastric reflux, and the response of the horse to passage of the fluid allowing gastric decompression yields valuable information. The presence of high volume net nasogastric reflux is not normal.

Amount, timing relative to the occurrence of colic, and character of reflux should be noted. A small intestinal problem is implied by the presence of significant amounts of fluid. The proximal small intestine when obstructed yields a high volume of reflux early following the time of colic onset. Duodenitis-proximal jejunitis (anterior enteritis) yields malodorous sometimes hemorrhagic fluid. Physical obstructions yield relatively fresh feed and intestinal fluids. Lower small intestinal lesions are much less likely to reflux until the later stages of the disease process. Colonic distension may result in reflux by causing duodenal compression.

Response to gastric decompression yields valuable information as to the character of the suspected lesion. A horse with a small intestinal functional ileus (anterior enteritis) will experience a relief of pain and a decrease in heart rate following decompression. Physical obstructive lesions are most likely to have little to no response to successful gastric decompression, with increasing amounts of small intestinal distention and reflux as the horse is hydrated.

**VAGINAL EXAMINATION**

Limited to the post foaling mare, careful evaluation of the vagina by manual palpation may reveal defects in the vaginal mucosa or full-thickness lacerations. The integrity of the uterine lumen may also be assessed with deeper palpation.

**CLINICAL PATHOLOGY**

**Packed cell volume (PCV)**

In many prognostic models, PCV is an important variable indicating survivability, with an elevated PCV above the reference range having been shown as a negative prognostic in-
dicator (Orsini, 1988; Puotunen-Reinert, 1986; Reeves, 1989). However, PCV was found to have no prognostic significance in another study (van der Linden, 2003). Therefore, PCV should not be used as the sole determinant of prognosis, but rather as an indicator of cardiovascular compromise.

**White blood cell count (WBC)**

A low WBC implies endotoxemia, with possibly devitalized intestine (Morris, 1991). Studies of horses with acute abdominal pain have shown variable significance of WBC (Parry, 1983a; van der Linden, 2003). Taken in the context of the overall clinical presentation, in addition to endotoxemia, pleuritis, impending colitis and peritonitis may present with an abnormal WBC and signs of apparent abdominal pain.

**TOTAL PROTEIN/ALBUMIN**

In surgical studies, decreased serum total protein concentration was associated with an increased risk of post-operative death in horses recovering from small intestinal surgery (Pascoe, 1983; Proudman, 2005). Total protein and albumin levels can therefore be considered important parameters to monitor in horses with acute abdominal disease.

**PERITONEAL FLUID**

The evaluation of single peritoneal fluid variables has been shown to have low sensitivity, specificity, and predictive value for determining lesion type, whether medical or surgical treatment was indicated, and outcome (Freden, 1998).

Gross appearance is the most valuable indicator of the presence of devitalized intestine and is most likely to aid in the determination of the need for surgery. Serial evaluation of abdominal fluid color and specific gravity has a high positive predictive value for type of intestinal lesion (Freden, 1998; Peloso and Cohen, 2010), whereas patient age and abdominal fluid color has a high positive predictive value for clinical outcome (Freden, 1998). Discoloration commences early in the course of the disease even while the segment of intestine involved is still viable.

Progressive alterations in the peritoneal fluid parameters can support the decision for surgical intervention (Ducharme, 1988). However, studies vary in their results with increased fluid volume, elevated leukocyte count, increased neutrophil percentage and elevated protein concentrations in one study not predictive of the integrity of the intestine (Swanwick, 1976), while in other studies protein levels were helpful (Allen, Jr., 1986).

Serial abdominal fluid color and specific gravity have a high positive predictive value for lesion type, while patient age and abdominal fluid color had a high positive predictive value for outcome. However, abdominal fluid analysis cannot in itself accurately predict lesion type, the need for medical or surgical treatment, or outcome in horses with acute abdominal disease (Freden, 1998).

**SELECTED CONDITIONS ASSOCIATED WITH COLIC IN THE PERIPARTUM MARE**

**The genitourinary tract**

**Peripartum hemorrhage**

Rupture of and subsequent hemorrhage from the uterine artery is the most common cause of death in mares post partum. The external iliac artery, utero-ovarian artery, and uterine artery have also been implicated (Rooney, 1964). The incidence of peripartum hemorrhage in the mare has not been determined by retrospective studies of large numbers of mares. Hemoperitoneum itself is a significant cause of abdominal discomfort in the horse, with approximately 13% of all cases due to rupture of uterine vessels (Dechant, 2006).

Although usually considered a problem of the postpartum period, reports exist of cases in the prepartum period (Pascoe, 1979; Rooney, 1964). Peripartum hemorrhage has been
reported to occur at any age, however older mares are considered to be at greater risk due to age-related degeneration of arterial vessels (Arnold, 2008). Uterine contractions and obstetrical manipulations further increase stress on the vessel wall (Gruninger, 1998).

Hemorrhage can occur into the peritoneal cavity, within the broad ligament of the uterus, within the uterine wall (mural hemorrhage), or into the uterine lumen. Combinations of these may occur. Hemorrhage into the peritoneal cavity leads to profound hypovolemia, pain and sometimes peracute death. If confined to the broad ligament or uterine wall, pain can be significant but prognosis for life better. Broad ligament hematomas may be incidental findings during routine reproductive examinations, or may be come acutely apparent a variable time after foaling following rupture resulting in abdominal hemorrhage and pain. Luminal hemorrhage is usually of less significance due to the relatively small amount of blood lost and lack of significant uterine distension.

Fractures of the pelvis may lacerate arteries or regional muscle bodies leading to significant hemorrhage into the surrounding musculature or peritoneal cavity. Apparent abdominal pain can result from the fracture itself or the presence of peritoneal blood.

PRE-PARTUM UTERUS

Torsion

Reported within the final three months of gestation but not usually associated with parturition (Doyle, 2002; Pascoe, 1981; Perkins, 1992). Mild to moderate abdominal pain is often seen. Devitalization of the uterine wall can lead to rupture and systemic illness. Diagnosis is made by rectal palpation, with the broad ligament coursing over the dorsum of the uterus indicative of the direction of torsion i.e. the ligament can be traced dorsally from its origin, across the dorsum of the uterine body, ending ventrally in the direction of torsion. Ultrasonography can indicate health of the uterine wall and viability of the fetus.

Rupture

Rare prior to parturition, perforation of the uterus can occur due to chronic stretch from a fetal hoof or external abdominal trauma contacting the heavily gravid uterus.

POST-PARTUM UTERUS

Hemorrhage

Rupture of uterine vessels leads to hematoma formation between the layers of the broad ligament. As previously stated, rupture occurs most commonly during parturition but has been reported both before and after (Williams, 2012). The hematoma initially appears uniformly hyperechoic before developing a heterogeneous appearance with separation of the blood into anechoic fluid and hyperechoic organizing tissue. Tearing of the broad ligament in the acute to subacute phase will allow leakage of blood into the peritoneal cavity and systemic signs. There is no reported predilection for side of rupture (Williams, 2012) with tears usually in the proximal uterine artery (Ueno, 2010).

Laceration, mural hematoma and necrosis

The result of vigorous expulsive efforts by the mare or misdirected obstetrical manipulations, the time course of clinical signs is somewhat dependent on the extent of the laceration and its location (dorsal versus ventral) allowing spillage of uterine content and aspiration of air. Pain results from ensuing peritonitis, with profound endotoxemia developing over 24 hours in most patients. Acute full thickness laceration of the uterine wall may appear initially clinically as hemoperitoneum before progressing to septic peritonitis. Mural necrosis followed by perforation may initially present with signs of peritoneal inflammation before rupture occurs and fulminant bacterial peritonitis ensues. Expulsion of intraluminal uterine fluid will exacerbate peritonitis, especially if endometritis is present post partum. Sudden onset of colic signs following uterine lavage with concurrent appearance of a large volume of relatively anechoic peritoneal fluid is highly suggestive of a pre-existing uterine perforation.

Inverted uterine horn ± retained placenta

An inverted uterine horn tip may occur following uncoordinated uterine contractions or uterine fatigue post foaling. Alternately, overzealous traction in cases of placental retention may iatrogenically invert the uterine horn. The characteristic target sign appearance may be difficult to obtain with transabdominal ultrasonography but is usually readily obtained transrectally. Chronic low grade pain is often seen with spontaneous cases, associated in later stages with fever and depression as uterine wall becomes devitalized. Iatrogenic cases may often develop severe pain at the time of placental traction.

Pneumometra

Aspiration and accumulation of air in the uterus has been reported as cause of postpartum colic (Livesey, 2008). Hyper-
Echogenic particles are visualized by ultrasonography within the uterine lumen or a hyperechoic gas interface adjacent to and within the uterine wall may be present obscuring ventral structures. Poor perineal conformation or endometrial infection with a gas producing organism should be suspected in these cases.

THE CAUDAL REPRODUCTIVE TRACT AND PERINEUM

Necrotic vaginitis may result from fetal oversize and prolonged obstetrical manipulations with the added complication of inadequate lubrication. Abrasion of the vaginal mucosa may lead to cellulitis, with hematoma formation progressing to abscessation if deeper layers are involved. Outright vaginal, rectal and perineal laceration may occur. Discomfort results from local inflammation and impediment of appropriate fecal passage. Spread of infection and inflammation may induce pelvicitis, with adhesion formation and chronic pain.

THE URINARY BLADDER

Rupture and uroperitoneum

The bladder wall may become traumatized and devitalized by compression against the pelvic brim during parturition (Nyrop, 1984) although this is rarely reported (Higuchi, 2002). Uroperitoneum may result (Jones, 1996) initiating irritation of the peritoneum with pain possible. The large volume of anechoic peritoneal fluid makes this a differential for hemoperitoneum and peritonitis, although it may be possible to visualize a folded and collapsed bladder by ultrasonography. Peritoneal fluid and systemic changes are characteristic of uroperitoneum.

CONDITIONS OF THE GASTROINTESTINAL TRACT

The entirety of the intestinal tract cannot be palpated or imaged, therefore the only indication of intestinal compromise or rupture may be the onset of fulminant peritonitis and clinical signs of endotoxemia. Ultrasonographic findings may likely be not pathognomonic for any particular lesion, however deviation from normal viscus location, anatomy or size warrants further investigation.

Physical trauma to the gut may progress to ischemic necrosis of the affected areas or laceration of the rectum itself may occur during parturition. Compromise to the gastrointestinal tract, with translocation of bacteria and inflammatory mediators, or more seriously spillage of intestinal content or feces, results in the onset of endotoxemia with profound circulatory disturbances. Concurrently, pain results directly from intestinal compromise or peritonitis.

THE CECUM

The most common site of postpartum rupture is the tip of the cecum (Frazer, 2003). The fetal hoof compressing tympanic cecal wall is thought to lead to pressure necrosis and rupture (Platt, 1983). Non-steroidal anti-inflammatory drugs may depress motility when used for post foaling discomfort.

SMALL COLON AND MESENTERY

Small colon may suffer bruising from compression during foaling, or avascular necrosis from disruption of the mesenteric attachments. The small colon has a relatively short mesocolon which can tear with passage of the fetus (Dart, 1991; Frazer, 2003). Segmental necrosis and entrapment may result from rents in the mesocolon (Dart, 1991). Lesser trauma may result in impaction and colic with variable signs of systemic disease. Increased peritoneal fluid with inflammatory changes in conjunction with signs of endotoxemia may be the first indication of small colon devitalization.

SMALL INTESTINE AND MESENTERY

With ultrasonography small intestinal strangulation can be suspected when distension, mural thickening and loss of motility are noted (Klohn, 1996). Dilated small intestine with motility was associated with large colon lesions, and wall thickening with motility is present in peritonitis (Klohn, 1996). Jejunum may become incarcerated through a tear in the mesentery (Gayle, 2000). Alternatively, disruption of the blood supply may cause mural necrosis to ensue.
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†2016 Lebel Marketing Veterinary Market Survey
LARGE COLON

The large colon is at increased risk of torsion in postpartum mares (Hance, 1992). In one review this was the most common diagnosis for referral emergency presentations of postpartum mares (Dolente, 2005). More chronic cases may have vague presenting signs including inappetence and depression (Doyle, 2002). Increased wall thickness, gaseous distension and loss of sacculations due to profound distension are visible ultrasonographically (Abutarbush, 2006). The cecal and colonic mesenteric vessels usually present in the right paralumbar fossa coursing ventrally become engorged and tortuous with colonic displacement or torsion (Grenager, 2011; Ness, 2012). Impaction may result from diminished water intake, depressed motility due to systemic disease and inappetence, and pain resulting from perineal trauma slowing fecal passage.

ENTERITIS

Altered feed intake and quality, and the addition of medications (e.g. placentitis treatment) may induce enteritis or enterocolitis. Pain results from intestinal inflammation, and distension resulting from both diminished gastrointestinal transit and increased gas production. Assessment of the majority of the intestinal tract by ultrasonography is difficult. Response to nasogastric intubation, clinical impression and evaluation of blood work aids diagnosis.

OTHER CONDITIONS

Pelvic fracture

The result of trauma at parturition, whether by fetomaternal disproportion and excessive traction to facilitate fetal expulsion, or the result of a fall. Pain can be manifest as reluctance to stand and recumbency which can be interpreted as colic.

DISORDERS OF THE BODY WALL

Ruptured body wall, ruptured rectus abdominis, and prepubic tendon rupture cause an abrupt change in shape of the body wall. Subcutaneous edema, fluid, hemorrhage and muscle fiber disruption are visible with ultrasonography although identification of the specific tissue involved can be difficult (Hanson, 1986). Prepubic tendon rupture results in ventral abdominal wall deviation, increasing regional edema and pain (Hanson, 1986). Herniation of the abdominal wall has the potential to incarcerate gut (Hanson, 1986).

DIAPHRAGMATIC HERNIA

Diaphragmatic hernia is a rare parturient complication with a guarded prognosis (Romero, 2010). Incarcerated viscera has been reported to include small intestine, large intestine, stomach, spleen and liver (Moll, 1999; Romero, 2010). With ultrasonography, strangulation of gut may be visible as thickened intestinal wall and increased peritoneal fluid. Intrathoracic intestine may be noted appearing cranial to the diaphragm shadowing the lung and pleural fluid may be increased.

SUMMARY

The peripartum mare can experience the full range of colic diagnoses, however the gravid uterus provides unique challenges to examination and decision making. Compromise to the uterine wall tends to progress steadily to peritonitis and discomfort once perforation has occurred, this being immediate with laceration or delayed with mural bruising and necrosis. Fever, depression, inattention to the foal and a lack of milk production are compatible findings.
INTRODUCTION

The neck forms an important component of the axial skeleton, especially for ridden exercise, as it forms the connection between the rider’s hands and the horse’s head and the rider’s seat and leg contact with the horse’s trunk. A basic understanding of the functional anatomy and biomechanics of the neck and cervicothoracic junction is needed for practitioners to diagnose, treat and provide training recommendations for horses with neck injuries or to optimize sport horse performance. The structural and functional contributions of individual vertebral anatomical features to segmental mobility or stability need to be fully recognized and understood to direct diagnostic and therapeutic approaches in affected horses. The effects of induced head and neck positions on local tissues, upper airway dynamics, regional spinal biomechanics, and overall locomotion patterns is an area of active research. The short-term effects of different head and neck positions on measures of performance and equine welfare has been recently evaluated; however, the long-term effects of extreme head and neck positions in flexion (rollkur) or prolonged elevation in extended head and neck positions are not currently known. The following material presents the structural and functional relationships in local anatomical features of the cervical vertebrae, regional influences of the cervical musculature and nuchal ligament, and systemic effects of induced head and neck positions related to the etiology, diagnosis and management of clinical issues.

OBSERVATION

Detailed examination of the neck should include assessment of the neck conformation, the shape and posture at rest, and the position of the head relative to the neck and trunk. Any signs of muscle atrophy, asymmetries or lack of ease of movement should be noted.

TOPOGRAPHIC ANATOMY

The ability to readily identify normal and abnormal anatomical structures within the cervical region aids in your diagnostic abilities and helps to guide your physical examination. Knowledge of specific muscle and bony landmark locations within the cervical spine and cervicothoracic region is critical in evaluating horses with neck pain and compensatory forelimb lameness or trunk stiffness. Awareness of normal muscle development and prominence of soft tissue or bony landmarks helps to inform the practitioner of potential underlying disease or specific rehabilitation issues that might need to be addressed.

GENERAL PALPATION TECHNIQUES

Musculoskeletal palpation requires a methodical approach with specific parameters that are assessed to judge their clinical relevance. General palpation techniques provide global assessments of overall muscle tone, development and nociceptive thresholds, without detailed focus on specific tissues or structures. Specific palpation techniques are then used to localize the extent and severity of tissue injury or inflammation to judge the clinical relevance or healing of specific tissues or structures. The development and refinement of manual palpation skills takes time and practice. Soft tissue inflammation is characterized as swelling, heat, altered function, redness, and pain. Taking the time and effort to readily identify and differentiate each of the individual components of inflammation will greatly aid your diagnostic abilities. General palpation typically involves a very superficial touch and cursory examination that allows you to get a general sense of the overall body tone and allows the horse to become accustomed to your presence and applied touch. This phase of the examination is geared solely toward you collecting information. Do not yet begin to form any conclusions about what you feel; only focus on characterizing the tissues directly underneath your hands or fingers.
1. **Muscle development** – Evaluation of general muscle development is often done visually (like body condition scores) without clear measures of the extent or severity of muscle loss or hypertrophy. Muscle development is evaluated by placing a flat hand along the epaxial cervical muscles from C2 to C6. In horses with well-developed neck musculature or in obese horses, the cervical muscles and the overlying doctor’s hand should be convex throughout the entire cervical region. In horses with poorly-developed or asymmetric neck musculature, the cervical muscles and the overlying doctor’s hand may be concave throughout the entire cervical region or the concavity may be localized to one or two vertebral levels on one or both sides of the neck. Intermediate neck muscle development is determined by having a flat contour of the cervical musculature as assessed by a flat hand. Localized heat and swelling associated with a potential cervical abscess needs to be localized and differentiated from abnormal muscle development or hypertonicity. Muscle atrophy may indicate chronic cervical pain or ipsilateral thoracic limb lameness.

2. **Muscle asymmetry** – Evaluation of muscle asymmetry helps to categorize neck disorders into general disuse atrophy or into nerve root signatures that involve unilateral peripheral nerves. Neck pain can induce generalized disuse atrophy, which would be expected to be distributed bilaterally symmetrical. Cranial-caudal or left-right differences in epaxial muscle development or tone are usually indicative of localized cervical motion segment restrictions that produce unilateral disuse atrophy or possible spinal nerve dysfunction producing a localized peripheral neuropathy. Cervical muscle asymmetry may be visualized when viewed from the position of the rider in the saddle or from an elevated surface looking down over both sides of the neck.

3. **Soft tissue textures** – The ability to identify different soft tissue textures and stages of inflammation or healing will help to improve your diagnostic skills and to localize the extent and severity of soft tissue injuries. Soft tissues are often characterized as having different textures. A clean hair coat feels different than a dirty or dusty hair coat. Thin skin located over the facial region feels different than thicker skin located over the back or pelvis. Inflamed skin or soft tissues feel slightly engorged and malleable, compared to lymphedema or cellulitis where the superficial and deep fascia is under substantial hydrostatic pressure and the tissue has a very taut texture or tone. Normal superficial fascia feels mobile and fluid in its movement under the skin compared to a region of superficial fibrosis with thickening and restricted fascial glide. Soft tissues (e.g., adipose) feel more compliant relative to firmer tissues (e.g., tendon or ligament). Relaxed muscle tissue has a different palpable composition relative to a contracted or hypertonic muscle.

4. **Soft tissue tone** – The ability to identify and differentiate local, regional and systemic muscle hypertonicity or hypotonicity is critical in the evaluation of myopathies and in assessing the progression of training programs or the response of individual horses to induced head and neck positions or the use of draw reins. Muscle tone is evaluated by placing a flat hand along the epaxial muscles from C2 to C6 with differing amounts of pressure to assess resting muscle tone and the response to applied manual pressure. Normal muscle tone should be firm but compliant. Muscle hypotonicity will produce slightly flaccid and under-developed muscles with little or no tone. Generalized muscle hypertonicity will produce a regional increase in muscle tone and possible painful response to gradually increasing manual pressure. Localized muscle hypertonicity or trigger points will have linear bands of distinctly hypertonic and painful muscles within characteristic muscles and locations within muscles. Superficial and deep fascia has different thicknesses and attachment sites, which results in varying fascial tone across body regions or left-right differences. Ligaments and tendons also have variable tone depending on adjacent muscle activation. The ability to provide detailed palpation to differentiate superficial and deep fascia, muscle and tendon, and the mid-body or insertion of ligaments is important in assessing soft tissue inflammation and healing.
5. Nociceptive responses – The response to gentle superficial and deep palpation of skin, fascia, muscle, ligaments, tendons, and bony landmarks is important in defining the extent and severity of neck pain. The tone and response to progressive amounts of applied pressure or compression of the epaxial and hypaxial cervical muscles should be uniform from cranial to caudal and equal on the left and right sides. Any abnormal or exaggerated responses to soft tissue palpation should be recorded and localized to a single intervertebral level, if possible. Neck muscle pain or hypertonicity may be produced or aggravated by an ipsilateral forelimb lameness. Apply gentle but firm compression of the brachiocephalicus muscle from the C2 to C6 vertebral levels. Any induced pain response is considered to be predictive, but not specific for thoracic limb lameness. Note any pain responses to direct pressure applied over bony landmarks or insertions of soft tissues onto bone (i.e., enthesis) that might indicate the need for diagnostic imaging.

6. Joint mobilization – Evaluation of joint quality and quantity is characterized as nonimpulsive, repetitive joint movements induced within the passive range of joint motion with the purpose of evaluating joint range of motion and resistance provided by periarticular tissues. Joint mobilization provides a subjective assessment of the quality and quantity of joint motion and provides insights into the biomechanical and neurologic status of an isolated articulation. Passive movement of an articulation from a neutral joint position first involves evaluating the range of joint motion that has minimal, uniform resistance. Then, as the articulation is moved towards the end range of passive joint motion, there is a gradual increase in the resistance to movement, which terminates at an elastic barrier (i.e., joint end-feel). The initiation of end range of joint motion is evaluated with any palpable change in resistance to induced movement.

HEAD AND NECK POSITIONS

The head and neck appears to be an essential element of equine gait mechanisms due to different characteristic oscillations at the walk, trot, and gallop that are closely linked to the movement patterns of the trunk and limbs. At the walk, canter, and gallop, the horse moves its head and neck to a greater extent than at trot, where the head and neck position is more constant. During body movements at stance and locomotion, the head and neck provide a major craniocaudal and lateral balancing mechanism employing input from the visual, vestibular, and proprioceptive systems. Stability and position of the head support the vestibular apparatus and help to hold the visual field in a horizontal plane. The cervical joint capsules and muscles contain mechanoreceptors that important roles in maintaining a stable head and neck positions for overall balance, coordination, and motor control during locomotion. With added weight associated with ridden exercise, the natural biomechanical response is head and neck elevation, trunk extension, forelimb protraction, and hind limb retraction postures.

INDUCED HEAD AND NECK POSITIONS DURING RIDDEN EXERCISE

Human preferences for head and neck postures in horses are often based on esthetics and ease of training and often include accentuated head and neck flexion. Different head and neck conformations have been selected for across horse breeds and disciplines presumably due to advantages for certain types of work or inducing specific gait characteristics. Collection is associated with increased stride duration and fore- and hind limb stance duration while speed and stride length are usually reduced. The idea behind raising the neck and head is to create a greater degree of elevation by redirecting the horizontal movement towards a more vertical direction. It is proposed that elevation of the head and neck allows a more effective transfer of propulsive forces from the hindquarters to the trunk. However, among riders it is often claimed that back activity is improved by lowering the head and neck. The opposing orientation of the head and neck to that of the traditional approach implies a different balance between forehand and hindquarters. An increased prevalence of extreme neck flexion acquired through rein tension has been reported in both dressage and Western
pleasure training methods. Dressage horses are commonly ridden during warm-up for competitions with their nasal plane behind the vertical. It is hypothesized that overflexion of the head and neck maximize control of the horse’s movement, induces trunk elevation, and may aid in training new movements. The short-term effects of induced head and neck positions have been recently evaluated. In general, it seems that the height of the neck positioning influences movement within other body regions more than the present or absence of poll flexion. Extreme positions induce more changes than the less extreme positions. It is unknown what the long-term consequences of these exaggerated head and neck positions are related to joint physiology, vestibular mechanisms, motor control, and general equine welfare.

NECK PATHOLOGY

In general, spinal-related problems can be categorized as soft tissue, osseous or neurologic disease processes. Clinical conditions affecting the cervical vertebral column include soft tissue disorders involving musculotendinous or ligamentous structures; osseous disorders of the vertebral body, vertebral arch, or vertebral processes; and neurologic disorders producing compromise of the spinal cord or spinal nerves. In humans, pain-sensitive structures of the axial skeleton are thought to include the following: nerve roots, posterior fibers of the annulus fibrosus, dorsal and ventral longitudinal ligaments, supraspinous ligament, interspinous ligaments, ligamenta flava, joint capsule of the cervical synovial articulations, intra-articular synovial folds, vertebral vasculature, cherry musculature, and periosteum of the vertebrae. This information provides some guidance for sources of neck pain and altered cervical proprioception, such as nerve roots and dorsal root ganglia; other sources of intervertebral instability, such as disk degeneration and the effects of joint effusion on inhibition of deep spinal musculature; and finally the clinical significance of osteophytes that are not exclusively localized to the synovial articulations and their joint margins in the horse. Knowledge of isolated malformations of specific anatomical features helps to better understand the pathogenesis and clinical relevance of the identified osseous or soft tissue changes.

As we become better skilled at identifying neck pain and dysfunction, our threshold of being able to identify differing levels of nociception, proprioception, muscle development and activation, motor control, and cervical joint range of motion becomes more refined. In the past, the dogma was that cervical facet osteoarthritis was the sole cause of neck pain in horses and that cervical vertebral myelopathy was the sole cause of ataxia. Currently, we are seeing clinical cases of neck pain with little or no evidence of bony proliferation indicative of osteoarthritis on routine cervical radiographs and cases of altered proprioception and body awareness, without obvious signs of ataxia, negative myelographic findings, and no histological evidence of spinal cord compression. This inability to readily identify subtle or poor defined causes of neck pain and altered proprioception has stimulated the need to rethink current diagnostic approaches and to expand the search into other possible sources of neck pain and dysfunction and to differentiate and localize pain syndromes within the cervicothoracic region and forelimb of affected horses.

CERVICAL DYSFUNCTION

In veterinary medicine, we often focus on structural issues (e.g., fractures, joint effusion, tendinitis) as this disorders can be documented with diagnostic imaging, and we may give less credence or even overlook functional components of spinal injuries or diseases. In humans, neck and back pain are leading causes of disability and despite advanced imaging and having patients verbally communicate their symptoms, a large percentage of spinal disorders are still termed “non-specific” neck or back pain due to a lack of a clear structural diagnosis. Similar diagnostic challenges surely occur in our equine patients, but we are often reluctant to define them as “non-specific” as this gives the impression of being nondiagnostic; however, we often fail to take the next step and further categorize the perceived neck pain or dysfunction as primary stiffness, instability, altered proprioception, or abnormal motor control and weakness.

SUMMARY

Specific anatomic features of the cervical vertebrae have direct biomechanical and clinical influences on neck mobility and function. Any induced head and neck position has measurable effects on trunk and limb function. A deeper understanding of the structural and functional relationships within the cervical spine will help practitioners to become better diagnosticians and to provide more focused treatment and rehabilitation programs in affected horses.
You Want To Buy This One??  My Approach To The Purchase Exam In The Sport Horse

Cooper Williams VMD, DACVSMR

The Pre-“Pre-purchase examination”-Ask for any possible information before scheduling your exam.

Images (Radiographs, Sonograms, MRI, Scintigraphy, Etc.)
1. Any available medical history (ie. Injection history, surgical/medical history, etc.
   a. Ask specifically about conditions like headshaking
   b. (One extreme circumstance I even asked for an arthroscopy video which was sent)
2. Show records are available-(any gaps in show record?? Ask why)
   a. Videos of horse being ridden or in competition (supplied or check YouTube)
Schedule-Ideal if buyer is present, but happens less than half the time-at least available by phone

Examination-(start in a quiet and dark area)
Introduce yourself to the horse without performing anything. Start with the basics-
1. Temperature
2. Ophthalmic
3. Oral (wash the mouth out if needed) ie. Upper Last premolar/first molar
4. Otic
5. Cranial Nerve Exam (as part of ophthalmic, oral, otic) + Skull symmetry
6. Cardiac (HR, Murmurs?, Rhythm? Simultaneous pulses? Jugular Veins? Spend time listening carefully on both sides) Any questions - refer to cardiologist
7. Respiratory (RR, nasal discharge?, breathing pattern? Lungs at rest and after rebreathing.
8. Recovery time? Laryngeal Palpation?
9. General Condition-weight, coat

Musculoskeletal Exam (Majority of Examination)
1. Observation of body position/posture during examination
2. Body Symmetry-Square the horse-Front end? Neck? (Get on your knees!), Hind End?, Back?
3. Muscles and Bone structure
4. TMJ’s
5. Poll (head down)
6. Neck-
   a. palpate for any sensitivity, swelling, etc palpate in normal position and bent away
   b. mobility testing- baited (carrot best)-cranial and caudal neck mobility + dorsoventral
   c. (mobility + ability to hold mobility?, twisting?)
7. Back-
   a. Palpate-start gently-dorsal midline?, Dorsal muscles bilaterally
   b. Mobility Testing (Observing mobility and reactivity to mobility)
   c. Thoracic (Dorsiflexion, Ventroextension, Lateromotion)
   d. Lumbar (Dorsiflexion, Ventroextension, Lateromotion)
   e. Pelvic (Flexion and Extension)
Invitation to Participate in a Research Survey on Equine X-Ray Practices

You are invited to participate in an anonymous, 5-10 minute survey on EQUINE X-Ray practices in North America.

The results of this survey will be used to apply for funding to investigate radiation doses to equine radiographers.


Please forward this survey link to any workers involved in taking x-rays in your clinic who are not veterinarians.

If you have any questions about this study, please contact Dr. Monique Mayer at 306-966-7088 or monique.mayer@usask.ca, or Dr. James Carmalt at 306-966-6522 or james.carmalt@usask.ca
8. **Limbs**
   a. Palpate every square inch of limb from proximal limb through coronet.
   b. Joints for normal contours, fluid distension, and capsule texture
   c. Tendons and Ligaments origin to insertion if possible.
   d. Manipulate joints for range of motion and pain on flexion.

9. **Front Limb Specifics**
   Shoulder direct pressure for bicipital bursa, retraction (shoulder/neck overlap) protraction

10. **Abduction/Adduction**
   a. Carpus-flexion and extension
   b. PMCST-carefully palpate, tendons and ligaments weighted and unweighted, Especially PSL
   c. Ankle-Flexion and Extension, Apical and Basilar tests
   d. Feet-alignment with limb, comparison with other foot, medial/lateral balance, frogs, heels
   e. Collateral cartilages, Shoeing, shoe wear patterns
   f. Hind Limb Specifics
   g. Pelvic Bounce/Pelvic Tilt
   h. Stifle-patellar pressure, stifle in and out of locked position
   i. Hock-TTS, Jts, Pt of hock carefully, curb, capping, Churchill and Cunean Tests
   j. PMTST-carefully palpate, tendons and ligaments weighted and unweighted, Especially PSL
   k. Ankle-Flexion and Extension, Apical and Basilar tests
   l. Feet-alignment with limb, comparison with other foot, medial/lateral balance, frogs, heels
      Collateral cartilages, Shoeing, shoe wear patterns

Hoof Tester sensitivity (test for epicritic and protopathic pain)

**Observation of Movement (We video all of this)**

1. **In Hand**
   a. Walk on a small figure eight and on straightaway (hard smooth surface)-observe from Behind and from side (same gait away and back)
   b. Trot in hand on a hard flat surface observing from behind and from side.
   c. Dynamic stress tests (These are not diagnostic, they are suggestive)
      Observation of trot after both proximal and distal limb flexion tests
      Observation of movement after cross limb flexion tests
      Observation of trot after hind limb extension tests